Precession of the orbit of Mercury and Newtonian gravity.

Bezverkhniy Volodymyr Dmytrovych.

Ukraine, e-mail: bezvold@ukr.net

It is most likely that Newtonian gravity can explain the precession of the orbit of Mercury, but for this it is necessary to additionally take into account all the effects.

Mercury is very close near the Sun and therefore, the tidal power of the Sun acting on Mercury will be significant. It will be reasonably assumed that the precession of the orbit of Mercury is a consequence of the collaboration of the tidal power of the Sun and the Coriolis forces acting on Mercury.

Coriolis strength occurs when the material point is moved relative to the rotating reference system. Therefore, the rotation of Mercury around its own axis when moving along the ellipse, together with the tidal power of the Sun, will inevitably lead to the emergence of the Coriolis force, which will be perpendicular to the direction of tidal movement.

I would like to emphasize that the Coriolis force is in the same plane of circular motion of the reference frame (when the body moves from the center of the circle to the periphery (along the radius)), but is perpendicular to the speed of displacement along the radius.

"...In the Northern Hemisphere, the Coriolis force applied to a moving train is directed perpendicular to the rails, has a horizontal component and tends to shift the train to the right in the direction of travel. Because of this, the flanges of the wheels located on the right side of the train are pressed against the rails...

Let in any inertial reference system (IFR) there is a radius uniformly rotating around an axis perpendicular to it. If a material point (MP) moves along this radius in the direction from the center of rotation with a constant velocity relative to the radius, then along with an increase in the distance from the center of rotation, the component of the body's velocity directed perpendicular to the radius also increases in IFR. Hence, in this case, the component of the point acceleration perpendicular to the radius is nonzero. This component of the MP acceleration in the inertial reference frame is the Coriolis acceleration…" [1].

If we consider all that has been said about the Coriolis force and look at the displacement of the orbit of Mercury, then it is very likely that this is one effect. That is, the precession of the orbit of Mercury is caused by the Coriolis force and the tidal action of the Sun.

In principle, even without a strictly analytical solution, this hypothesis is easy to test. To do this, you need to simulate the Sun - Mercury system on a computer and break Mercury into many material points with a certain mass (for example, a trillion points). The more dots there are, the better. A certain Hooke force must act between the points themselves. Naturally, Mercury must rotate around its axis and along the ellipse.

It is also necessary to take into account that the center of mass of the Sun-Jupiter system is outside the volume of the Sun, and therefore, the Sun moves around this center of mass. That is, the Sun itself makes a small orbital motion... Perhaps this is one of the reasons, or the main reason, the precession of the orbit of Mercury. At the same time, the Sun rotates around its axis at the equator faster than at the poles (the period of rotation at the equator is 25.34 days, at the poles - almost 38 days). In general, everything is complicated! So it's better to just program.

We divide the Sun and Mercury into trillions of points, we take into account the rotation of the Sun and Mercury around their own axes, we also take into account the orbital speed of Mercury (and the Sun), we introduce Newton's law of gravity... and we get the precession of the orbit of Mercury!

It would be interesting to check the non-Euclidean geometry of space in the orbit of Mercury, especially since it is quite simple to do this: you need three satellites in the orbit, forming a triangle, and you need to measure the sum of the angles of this triangle with the required accuracy. It seems to me that the result of such measurements will be intriguing.

Moreover, this will be a direct measurement of the non-Euclidean space (if it is non-Euclidean). That is, if the sum of the angles of the triangle is different from 180 degrees - near the orbit of Mercury, real space is non-Euclidean; if the sum is 180, the space is flat. This is ideal because direct experimentation is irrefutable. For example, in organic chemistry, the structure of a molecule can be seen “directly” using X-ray diffraction analysis. Chemists do this in controversial cases, and then all discussions cease, since an X-ray structural “photo” is literally a “photo” of a three-dimensional molecule.

In addition, based on the giant triangles, we know for sure that on the scale of the Universe, space is strictly Euclidean, that is, flat.

Recall that Arthur Eddington in 1919 measured the curvature of the trajectory of light near the Sun (solar eclipse on May 29, 1919), the results of which confirmed the prediction of Einstein's general relativity about the deflection of light in the gravitational field of the Sun.

The curvature of the trajectory of light under the influence of gravity was predicted by Newton, moreover, the curvature of the trajectory of light in classical mechanics should be 0.87″, and general relativity predicts a more accurate value: 1.75″.

But, if we incorrectly take into account the distribution of the gravitational potential near massive objects (rotating!), Since the tidal effect and the Coriolis force are not taken into account, then there is nothing surprising that general relativity gives a more accurate value. Since general relativity uses tensors (tensor fields), which will more accurately give the potential distribution in an extended space. It's just math. No

more. Tensors are used where there is a certain distribution of tension in space (the work of Tidal Forces!!!), for example, in mechanics, electrodynamics.

It is absolutely normal that, due to gravitational attraction, light changes its trajectory, but at the same time there can be no question of any curvature of space.

"...Gravitational curvature of light - a change in the trajectory of a light beam under the influence of gravity - follows from classical mechanics and was predicted by Isaac Newton.

For a ray passing near the surface of the Sun, the curvature of the trajectory in classical mechanics should be 0.87″.

General relativity, published by Albert Einstein in 1915, predicts twice the deflection of the beam: 1.75″.

Observation of stars, the light of which passes near the Sun, is possible only during a total solar eclipse, when the sky becomes completely dark..." [2].

Imagine a 3D Cartesian coordinate system in the center of which there is a large mass. Then, when the light moves in a straight line, near the center, there will be curvatures of the trajectory of light, since the light is attracted to the mass. In this case, the 3D coordinate system does not change, like Newtonian space!

The curvature of the continuum is the interpretation of general relativity. In fact, these are representations of space in which there is mass through a geometric construction. No more. It is just a mathematical device describing reality.

Photons, like any particles with a certain amount of energy (that is, inert mass), can move along different trajectories: straight, elliptical, circular, etc. If we take it as an axiom that photons move only in a straight line, we automatically get a curved space.

Thus, it is most likely that space is always Euclidean, both macroscale and microscale. Let me remind you that in quantum mechanics, space is Euclidean. Light near large masses, such as stars, black holes, etc., really changes its trajectory, but real space does not change and is strictly Euclidean. That is, flat.

Somehow unexpected. Let's think... and wait for experimental confirmation...

1. Coriolis force. Wikipedia. https://en.wikipedia.org/wiki/Coriolis_force
2. Solar eclipse. Wikipedia. https://en.wikipedia.org/wiki/Solar_eclipse